# 3 PHYSICAL EXAMINATION & CLASSIFICATION OF FIRED CARTRIDGE CASES

## 3.1 Introduction

The initial examination of any fired cartridge case evidence will include the completion of a worksheet. These worksheets will include the physical description of the fired cartridge case and will serve as a source to document the condition of the evidence as received and any tests or comparisons performed.

## 3.2 Safety Considerations

Examinations performed in the Firearm and Toolmark Section are inherently hazardous. These procedures involve hazardous chemicals, firearms, ammunition, and power tools. All hazardous procedures must be performed in compliance with the DFS Safety Manual.

## 3.3 Preparation of Cleaning Solutions

**NOTE: ALWAYS ADD ACID TO WATER. NEVER ADD WATER TO ACID.**

### 3.3.1 Acetic Acid Solution

- Prepare a 15% Acetic Acid Solution by combining 150 milliliters of Glacial Acetic Acid to 850 milliliters of distilled water
- Store solution in an appropriate, sealed container that is marked with the date and initials of the preparer
- Record in the Firearms Quality Record Book

### 3.3.2 Bleach Solution

- Prepare a Bleach Solution by combining 10 milliliters of bleach to 90 milliliters of distilled water
- Store solution in an appropriate, sealed container that is marked with the date and initials of the preparer
- Record in the Firearms Quality Record Book

## 3.4 Instrumentation

- Comparison Microscope
- Stereo Microscope
- Micrometer/Caliper
- Ruler
- Scale/Balance

## 3.5 Minimum Analytical Standards and Controls

Appendix A

## 3.6 Procedure or Analysis

The evidence will be marked in accordance with the Quality Manual. A systematic approach should be used for the physical examination and classification of fired cartridge cases, with recording of findings and observations in notes.

### 3.6.1 General, Visual, Physical, and Trace Examinations

The initial examination of any cartridge case will include a worksheet. This worksheet will serve as a source to document the condition of the evidence as received. Further information will be added to the worksheet as tests are performed.

Examine the cartridge case visually and microscopically for any trace material. Determine if further examination of the material is necessary and consult the appropriate section prior to the removal of the material. Document findings and observations and record in notes.

Once the cartridge case has been examined for the presence of pertinent trace evidence material, visual and physical examinations are conducted to determine the following features, to be documented on the worksheet:

- Any trace material present
- Caliber
- The possible manufacturer/marketer of the cartridge case
- Ignition system – centerfire, rimfire, other
- Description of metal used in cartridge case and primer
- Description of headstamp
- Description of firing pin impression

3.6.2 Trace Material Examination

Evidence recovered during an investigation may contain trace material transferred from the crime scene. This material may be in the form of blood, tissue, plaster, paint, hairs, fibers, glass, etc. The examiner needs to evaluate the importance of this evidence, and if further examination of the material is necessary, remove and preserve a sample of the material present. Removal of the material may also be necessary to allow the proper examination of the evidence.

- Remove material being careful not to damage the evidence
- Place the removed material into a suitable container/packaging for possible submission to the appropriate section for further examination
- Record findings and observations in notes

If the trace material IS NOT going to be retained for further examination, proceed with the following:

- For evidence containing blood, tissue, or other biohazards, soak or sonicate the evidence for at least one (1) minute in a Bleach Solution (refer to 3.2)
- Remove loosened material by rinsing with methanol or water
- Remove plaster by soaking in a 15% Acetic Acid Solution (refer to 3.2)
- Remove paint by soaking in alcohol or acetone
- Use a non-abrasive brush to remove loose material
- Use Naval Jelly™ or E-zest™ coin cleaner to removed dark stains as needed
- Record findings and observations in examiner's notes

3.6.3 Caliber Determination

Caliber can usually be determined by examination of the headstamp of the cartridge case, and is written as a numerical term that may be depicted with or without a decimal point. If it is not legible on the headstamp, the cartridge case can be compared with laboratory standards, available manufacturer literature, or the computerized FBI Standard Ammunition File.

3.6.4 Determination of Marks

Visual and microscopic examination of the cartridge case may reveal a variety of markings. Types of marks that might be found may be as follows:

Breech face class marks
Extractor marks
Ejector marks
Resizing marks
Chamber marks
Anvil marks (rimfire only)
Magazine marks
Ejection port marks
Other marks

As appropriate, compare marks on cartridge case with tests from a firearm or with other cartridge cases (see Section 5).

Only the above marks necessary to effect an identification or elimination are required to be documented in the case notes. Additional markings, as determined by the examiner, may also be documented.

3.6.5 Interpretation of Results

- May determine caliber and brand/manufacturer/marketer of cartridge case
- May determine if there are suitable markings for identification with a firearm or with other fired components
- May determine possible firearms that could have fired cartridge case
- May be able to identify the firearm in which it was fired
- Record interpretation of results in the notes

**3.7 Appropriate Appendices**

Appendix A - Calibration Standards

Appendix C - Work Sheets

**3.8 References**

Association of Firearm and Toolmark Examiners Glossary, 3rd ed. 1994.

Association of Firearm and Toolmark Examiners Glossary, 4th ed. 2001.

Howe, Walter, J. “Laboratory Work Sheets”. AFTE Newsletter. No. 2, August 1969, p. 13.

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